

What we claim is:

1. A fuel cell assembly, which has a housing defining an electricity generation/combustion chamber, and
5 electricity generation/combustion means disposed within said housing, and in which a fuel gas and an oxygen-containing gas are supplied to said electricity generation/combustion means, and a combustion gas formed within said electricity generation/combustion chamber is
10 discharged from said electricity generation/combustion chamber,

wherein a heat exchanger having a first channel and a second channel is disposed on at least one surface of said housing,

15 said combustion gas is discharged from an interior of said electricity generation/combustion chamber through said first channel of said heat exchanger, and
one of said oxygen-containing gas and said fuel gas is supplied to said electricity generation/combustion
20 means through said second channel of said heat exchanger.

2. The fuel cell assembly according to claim 1,
wherein

25 said first channel and said second channel in said heat exchanger are superposed in a thickness direction of said surface, and

said first channel and said second channel are opposed channels extending zigzag.

30 3. The fuel cell assembly according to claim 1,
wherein

said housing has opposite flat side surfaces extending substantially vertically, and

35 said heat exchanger is flat plate-shaped and is disposed on each of said opposite side surfaces.

4. The fuel cell assembly according to claim 1,
wherein

5 there are disposed a lower gas chamber located in a
lower end portion of said housing, an upper gas chamber
located in an upper end portion of said housing, and a
communication gas chamber extending in an up-and-down
direction within said housing to bring said upper gas
chamber and said lower gas chamber into communication,

10 said second channel has an inflow port disposed at
a lower end of said heat exchanger, and an outflow port
disposed at an upper end of said heat exchanger and
leading to said upper gas chamber, and

15 one of said oxygen-containing gas and said fuel gas
is flowed into said second channel through said inflow
port, and is supplied from said second channel to said
electricity generation/combustion means through said upper
gas chamber, said communication gas chamber, and said
lower gas chamber.

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5. The fuel cell assembly according to claim 1,
wherein

reforming means is disposed within said electricity
generation/combustion chamber,

25 said fuel gas is supplied to said electricity
generation/combustion means through said reforming means,
and

30 said oxygen-containing gas is supplied to said
electricity generation/combustion chamber through said
second channel.

6. The fuel cell assembly according to claim 1,
wherein

35 a plurality of electricity generation units are
arranged in parallel within said housing,

said electricity generation/combustion means includes a cell stack composed of a plurality of cells, each of said electricity generation units includes said cell stack, a fuel gas case defining a fuel gas chamber, a reforming case, an unreformed gas supply pipe connected to said reforming case, and a fuel gas feed pipe connecting said reforming case and said fuel gas case, said cells of said cell stack are arranged on one surface of said fuel gas case,

10 said fuel gas within said fuel gas case is supplied to said cells, and said oxygen-containing gas is supplied through said second channel of said heat exchanger.

15 7. The fuel cell assembly according to claim 6, wherein said plurality of cells are disposed upright on an upper surface of said fuel gas case, and said reforming case is placed above said cell stack.

20 8. The fuel cell assembly according to claim 6, wherein in each of said electricity generation units, said fuel gas case is in a slenderly extending rectangular parallelopipedal shape, and

25 said cells are arranged in line in a longitudinal direction of said fuel gas case.

30 9. The fuel cell assembly according to claim 6, wherein in each of said electricity generation units, said reforming case slenderly extends along said fuel gas case above said cell stack, said unreformed gas supply pipe is connected to one end portion of said reforming case, and

35 said fuel gas feed pipe connects said reforming case and said fuel gas case at other end portion of said

reforming case.

10. The fuel cell assembly according to claim 1,
wherein

5 said electricity generation/combustion means
includes a plurality of cell stacks,

a first gas case supplied with one of said oxygen-
containing gas and said fuel gas is disposed within said
housing,

10 said first gas case has a hollow-shaped manifold
portion, and a plurality of hollow-shaped ejection
portions protruding from one-side flat surface of said
manifold portion substantially perpendicularly to said
one-side flat surface,

15 said ejection portions are arranged with spacing in
a first direction on said one-side flat surface,

an ejection hole is formed in at least one surface
of each of said ejection portions, and

20 each of said cell stacks is placed between the
adjacent ejection portions.

11. The fuel cell assembly according to claim 10,
wherein

25 said manifold portion is placed substantially
horizontally, with said one-side flat surface being
directed upwards.

12. The fuel cell assembly according to claim 10,
wherein

30 said ejection hole is in a form of a slit parallel
to said one-side flat surface and extending in a second
direction perpendicular to said first direction.

13. The fuel cell assembly according to claim 10,

35 wherein

a plurality of second gas cases of a hollow rectangular parallelopipedal shape placed on said one-side flat surface of said manifold portion between the adjacent ejection portions of said first gas case and extending in 5 said second direction are disposed within said housing,

the other of said oxygen-containing gas and said fuel gas is supplied to said second gas cases, and

each of said cell stacks is placed on each of said second gas cases.

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14. The fuel cell assembly according to claim 1, further comprising

an upper gas chamber disposed in an upper portion of said housing, and

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a plurality of gas introduction members hanging down from said upper gas chamber, and

wherein one of said oxygen-containing gas and said fuel gas is supplied through said upper gas chamber and said gas introduction members.

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15. The fuel cell assembly according to claim 14, wherein

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said electricity generation/combustion means includes a plurality of cell stacks each composed of a plurality of cells,

said cell stacks are arranged in parallel with spacing in a horizontal direction, and

said gas introduction members are pipes hanging down between said cell stacks and having lower ends open.

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16. An electricity generation unit comprising:

a fuel gas case defining a fuel gas chamber;

a cell stack composed of a plurality of cells arranged on one surface of said fuel gas case;

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a reforming case;

an unreformed gas supply pipe connected to said reforming case; and

a fuel gas feed pipe connecting said reforming case and said fuel gas case, and

5 wherein a fuel gas within said fuel gas case is supplied to said cells.

17. The electricity generation unit according to claim 16, wherein

10 said plurality of cells are disposed upright on an upper surface of said fuel gas case, and
said reforming case is placed above said cell stack.

18. The electricity generation unit according to claim 16, wherein

said fuel gas case is in a slenderly extending rectangular parallelopipedal shape, and
said cells are arranged in line in a longitudinal direction of said fuel gas case.

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19. The electricity generation unit according to claim 16, wherein

said reforming case slenderly extends along said fuel gas case above said cell stack,

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said unreformed gas supply pipe is connected to one end portion of said reforming case, and

said fuel gas feed pipe connects said reforming case and said fuel gas case at other end portion of said reforming case.

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20. A fuel cell assembly comprising:

a housing defining an electricity generation/combustion chamber; and

a plurality of electricity generation units

35 arranged in parallel within said electricity

generation/combustion chamber, and

wherein each of said electricity generation units comprises a fuel gas case defining a fuel gas chamber, a cell stack composed of a plurality of cells arranged on one surface of said fuel gas case, a reforming case, an unreformed gas supply pipe connected to said reforming case, and a fuel gas feed pipe connecting said reforming case and said fuel gas case, and

5 a fuel gas within said fuel gas case is supplied to
10 said cells.

21. The fuel cell assembly according to claim 20,
wherein in each of said electricity generation units,

15 said plurality of cells are disposed upright on an
upper surface of said fuel gas case, and
said reforming case is placed above said cell stack.

22. The fuel cell assembly according to claim 20,
wherein in each of said electricity generation units,

20 said fuel gas case is in a slenderly extending
rectangular parallelopipedal shape, and
said cells are arranged in line in a longitudinal
direction of said fuel gas case.

25 23. The fuel cell assembly according to claim 20,
wherein in each of said electricity generation units,
said reforming case slenderly extends along said
fuel gas case above said cell stack,
said unreformed gas supply pipe is connected to one
30 end portion of said reforming case, and
said fuel gas feed pipe connects said reforming
case and said fuel gas case at other end portion of said
reforming case.

35 24. A fuel cell assembly, which has a housing defining

an electricity generation/combustion chamber, and
electricity generation/combustion means disposed within
said housing, and in which said electricity
generation/combustion means includes a plurality of cell
stacks, a fuel gas and an oxygen-containing gas are
supplied to said electricity generation/combustion means,
and a combustion gas formed within said electricity
generation/combustion chamber is discharged from said
electricity generation/combustion chamber,

5 10 wherein a first gas case supplied with one of said
oxygen-containing gas and said fuel gas is disposed within
said housing,

15 said first gas case has a hollow-shaped manifold
portion, and a plurality of hollow-shaped ejection
portions protruding from one-side flat surface of said
manifold portion substantially perpendicularly to said
one-side flat surface,

20 said ejection portions are arranged with spacing in
a first direction on said one-side flat surface,
25 25. an ejection hole is formed in at least one surface
of each of said ejection portions, and
each of said cell stacks is placed between the
adjacent ejection portions.

30 26. The fuel cell assembly according to claim 24,
wherein
said manifold portion is placed substantially
horizontally, with said one-side flat surface being
directed upwards.

35 26. The fuel cell assembly according to claim 24,
wherein
said ejection hole is in a form of a slit parallel
to said one-side flat surface and extending in a second
direction perpendicular to said first direction.

27. The fuel cell assembly according to claim 24,
wherein

a plurality of second gas cases of a hollow
5 rectangular parallelopipedal shape placed on said one-side
flat surface of said manifold portion between the adjacent
ejection portions of said first gas case and extending in
said second direction are disposed within said housing,
the other of said oxygen-containing gas and said
10 fuel gas is supplied to said second gas cases, and
each of said cell stacks is placed on each of said
second gas cases.